

Remarks

Entry of the amendments, reconsideration of the application, as amended, and allowance of all pending claims are respectfully requested. Upon entry of the amendments, claims 1-15, 17-36, 38-44, 47-63 and 65-69 remain pending.

With the above amendments, applicants have cancelled several claims, without prejudice, and have amended the independent claims to further define the prefetching. For example, applicants recite that the initiating of the prefetching is automatic in response to detecting a pattern of requests, and that the automatically initiating is absent a disruption of access to data by applications. Support for this amendment can be found throughout the specification (e.g., FIG. 4, page 9, lines 8-13; page 11, lines 9-17, 23-27; page 12, line 22; page 13, lines 3-15 & 22-26). For example, FIG. 4 and related areas of the specification describe that when a request is made, certain analysis is made, and automatically, based on that analysis, prefetching begins. The initiating of the prefetching does not disrupt access to the data, as supported by the specification, which does not require a reboot or unmount/remount (see, e.g., FIG. 4). Further, several dependent claims have been added to also distinctly define applicants' invention. Again, support for these claims may be found at the locations indicated above. Thus, no new matter has been added.

Applicants gratefully acknowledge the indication of allowability of claims 18, 38, and 66, if rewritten in independent form. Applicants have rewritten those claims in independent form, and therefore, respectfully request an indication of allowance for those claims.

In the Office Action, dated December 22, 2004, claims 1-3, 9, 22-24, 30, 43-44, 49-51 & 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Pothapragada (U.S. Patent No. 6,442,682); claims 12, 33, 45-46 & 60 are rejected under 35 U.S.C. 102(e) as being anticipated by Undy et al. (U.S. Patent No. 6,647,487); claims 4-5, 25-26 & 52-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Kahle (U.S. Patent No. 6,574,712); claims 6-7, 27-28 & 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Kahle, and further in view of Ryan (U.S. Patent No. 5,367,656); claims 8, 29 & 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Lopez-Aguado et al. (U.S. Patent No. 6,317,810);

claims 10, 31 & 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Ryan; claims 11, 32 & 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Ryan, and further in view of Lopez-Aguado et al.; claims 13, 34 & 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Undy in view of Ryan; claims 14, 35 & 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Undy in view of Lopez-Aguado et al.; claims 15-16, 36-37 & 63-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Undy in view of Pothapragada; claims 17, 20, 38, 41, 47, 48, 65 & 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada; claims 19, 40 & 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Lopez-Aguado et al.; and claims 21, 42 & 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada in view of Ryan. Applicants respectfully, but most strenuously, traverse these rejections for the reasons below.

One aspect of applicants' invention is directed to a management technique for prefetching data of files. The technique determines when to prefetch data (e.g., inodes) by detecting access patterns that would benefit from such a prefetch. When a pattern of requests indicating that prefetch would be beneficial is detected, then the prefetching is automatically initiated. This is performed without causing disruption to the access of data by applications.

In one particular example, applicants claim a method of managing the prefetching of data of files (e.g., independent claim 1). The method includes, for instance, detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files; automatically initiating prefetch of data of a plurality of files, in response to the detecting, wherein the automatically initiating is absent a disruption of access to data by applications; and prefetching data of the plurality of files. Thus, in applicants' claimed invention, in response to detecting a pattern of requests, prefetching is automatically initiated without disrupting access to data by applications. This is very different from the teachings of Pothapragada.

In Pothapragada, an analysis is initially performed, and then after the analysis is complete and a decision has been made that prefetching would be beneficial, the system is rebooted, as explicitly shown in FIG. 1 (reference number 326) and described in column 5, line 30 of Pothapragada, to enable the prefetching. Specifically, the reboot allows mount options to be provided to the file system that directs the file system as to whether or not to prefetch files for all the directories or specific directories. This reboot is very disruptive to the applications needing to access data, since the reboot requires the shutting down and then the restarting of those applications. This is very different from that claimed by applicants.

As explicitly recited in the claims, in one aspect of applicants' invention, prefetching is automatically initiated, in response to detecting a pattern of requests, and the automatically initiating is absent a disruption of access to data by the applications. There is no requirement in applicants' technique to reboot the system (or to unmount and remount the file system), as required in Pothapragada. With appellants' invention, it is not necessary to shutdown and restart the applications, as is necessary in Pothapragada. Thus, applicants' claimed invention is very different from the teachings of Pothapragada.

Since Pothapragada explicitly teaches the disruption of access to data by requiring a reboot of the system, and since applicants' specifically recite that access to the data by the applications is not disrupted, applicants respectfully submit that Pothapragada does not describe, teach or suggest applicants' claimed invention. Thus, applicants respectfully submit that independent claim 1, as well as the other independent claims, is patentable over Pothapragada.

The dependent claims are patentable for the same reasons as the independent claims, as well as for their own additional features. For example, in dependent claims 12, 33 and 60, it is explicitly recited that the detecting includes automatically repeatedly determining whether the pattern of requests exists, and wherein the automatically initiating and prefetching do not occur when it is determined that the pattern of requests does not exist. This is described in applicants' specification (e.g., pp. 9-11 and FIG. 4) in which it is explained that when a stat call is issued by an application, a particular directory is accessed and steps are performed to determine whether prefetching is to occur. This is accomplished,

for instance, each time a directory is accessed (e.g., claims 13, 34 and 61). Thus, in applicants' claimed invention, a pattern is continuously looked for (e.g., each time a directory is accessed), and when a pattern is detected, then prefetching is performed. When a pattern is not detected, there is no prefetching. This is very different from the teachings of Pothapragada.

In Pothapragada, once a decision is made to prefetch, which is at the end of the analysis, all of the files in a directory are prefetched, every time the director is accessed, even if an application only accesses a single file. As such, the technique of Pothapragada only works well if the workload stays as it was during analysis. In contrast, applicants' technique is adaptable to changing workloads. Since Pothapragada does not describe, teach or suggest applicants' claimed element of automatically repeatedly determining whether a pattern exists and only prefetching when a pattern does exist, applicants respectfully submit that Pothapragada does not anticipate applicants' claimed invention. Therefore, applicants respectfully request an indication of allowability for claims 12, 33 and 60.

Similarly, applicants respectfully submit that claims 13, 34 and 61, which specifically recite that the automatically repeatedly determining occurs each time a directory is accessed is patentable over Pothapragada. There is no description, teaching or suggestion in Pothapragada of such a claimed element. Instead, Pothapragada teaches that an analysis is performed beforehand and then, if it is decided to prefetch, the system is rebooted and prefetching takes place regardless of the access to follow. Pothapragada fails to teach or suggest performing the analysis each time a directory is accessed. This would be too costly, since in order to initiate prefetching in Pothapragada, the system needs to be rebooted. Thus, the repeated analysis would be too disruptive to data access by the applications.

Based on the foregoing, applicants respectfully submit that their invention, as claimed in dependent claims 12, 13, 33, 34, 60 and 61, is patentable over Pothapragada.

In addition to the above, in dependent claims 14, 35 and 62, applicants respectfully submit that the automatically initiating prefetch occurs as soon as the pattern of requests is detected. This is very different from Pothapragada in which an analysis is performed, and then after the analysis is complete, the system is rebooted and then prefetching can occur.

Since applicants do not need a reboot and prefetching occurs as soon as the pattern is detected (see, e.g., FIG. 4 of applicants' specification), which is very different from Pothapragada, applicants respectfully submit that their invention is patentable over Pothapragada.

For at least the above reasons, applicants respectfully submit that their invention is patentable over Pothapragada, and respectfully request an indication of allowability for all pending claims. The other cited references do not overcome the deficiencies of Pothapragada.

Should the Examiner wish to discuss this case with applicants' attorney, please contact applicants' attorney at the below listed number.

Respectfully submitted,

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